

## ABSTRACT

A gas separation system for separating a feed gas mixture into a first gas component and a second gas component comprises a stator, and a rotor rotatably coupled to the stator. The stator includes a first stator valve face, a second stator valve surface, and a plurality of function compartments opening into the stator valve surfaces. The rotor includes a first rotor valve surface in communication with the first stator valve surface, and a second rotor valve surface in communication with the second stator valve surface. The rotor also includes a plurality of rotor flow paths for receiving gas adsorbent material therein for preferentially adsorbing the first gas component in response to increasing pressure in the rotor flow paths in comparison to the second gas component. Each rotor flow path includes a pair of opposite ends opening into the rotor valve faces for communication with the function compartments. Centrifugal turbomachinery is coupled to a portion of the function compartments, and includes an impeller which has a plurality of impeller flow paths for exposing each rotor flow path to a plurality of discrete pressures as the rotor rotates for separating the first gas component from the second gas component.